BALANCE OF PLANT CONSIDERATIONS FOR TOXECON ™ MERCURY AND MULTI-POLLUTANT CONTROL PROJECTS

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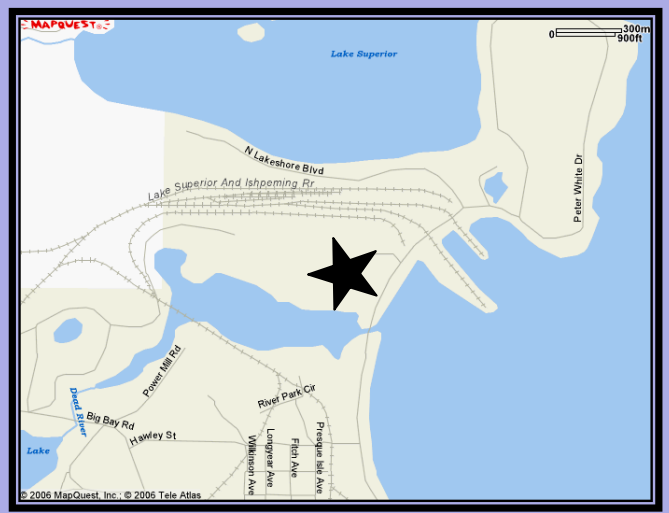
Clean Coal Power Initiative

- Project Participants
  - Department of Energy – NETL
  - We Energies
  - ADA – ES
  - Cummins & Barnard, Inc
- Five Year, $50 million (DOE 24.9 million)
- Goals:
  - Reduce Hg emissions by 90%
  - Develop reliable Hg CEMS
  - Investigate sorbents for NOx and SO2
  - Investigate Recovering Hg from used sorbent

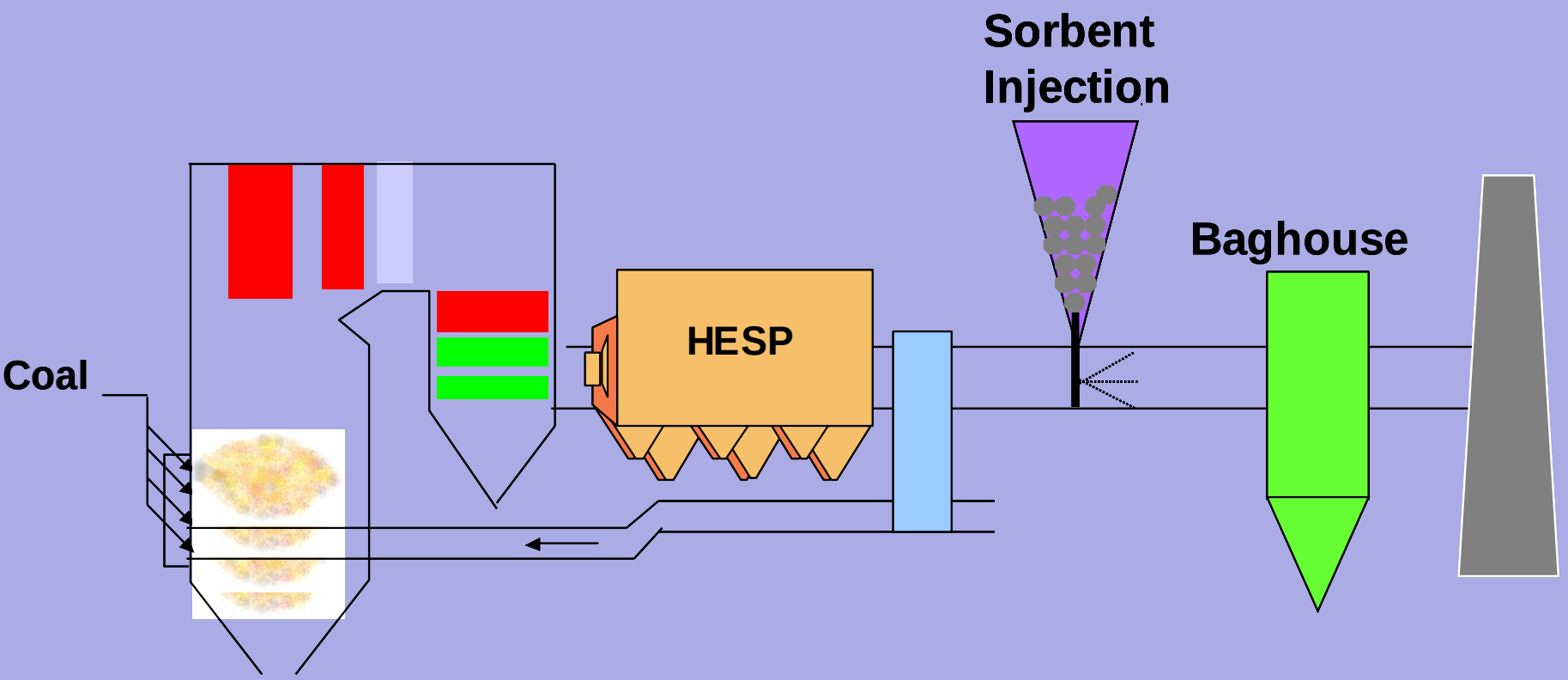
Presque Isle Power Plant
Marquette, Michigan



Presque Isle Power Plant (PIPP)

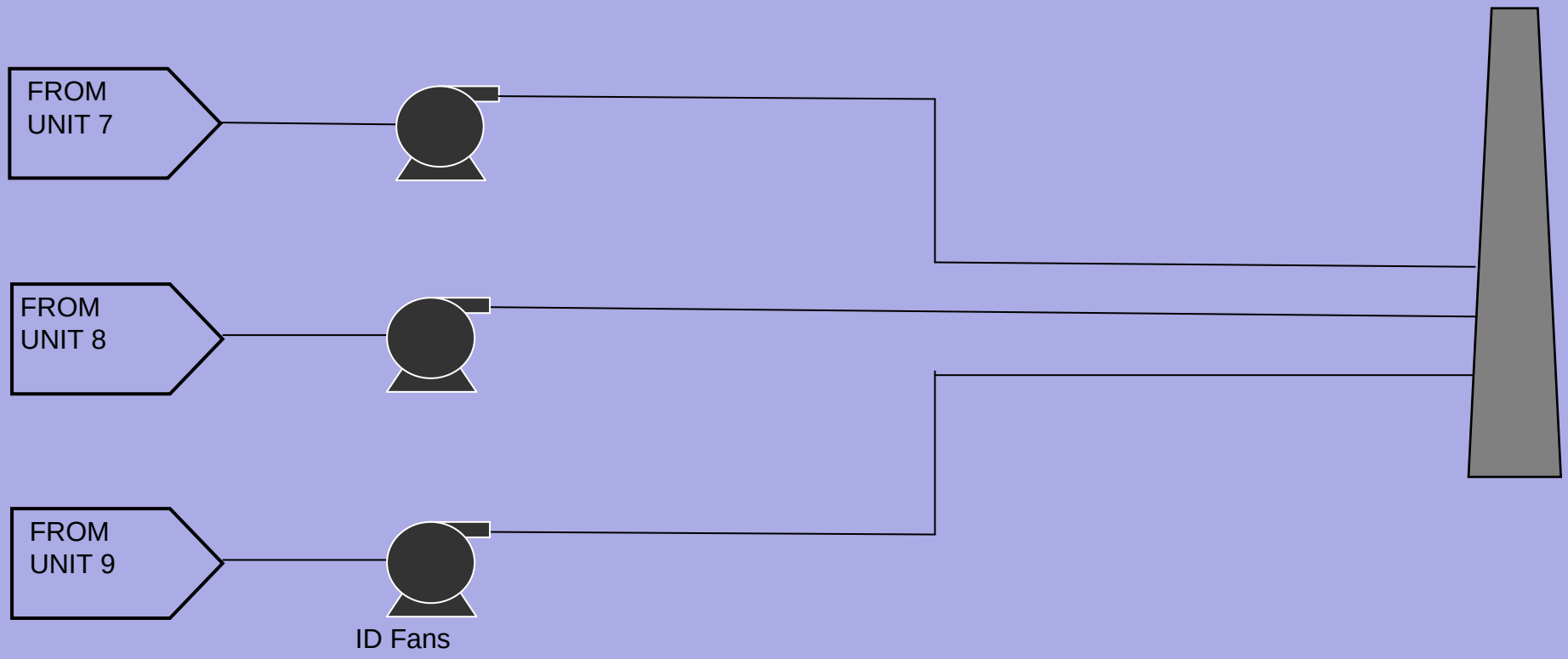
- Plant was developed in the early 1950's and expanded over the years to 9 coal fired Units
- The 9 Units total 625 MW that represents approximately 50% of the power generation in the U.P.
- Units 7,8 & 9 are 90 MW units burning western bituminous, PRB coal
- PIPP currently sells fly ash for concrete

TOXECON™

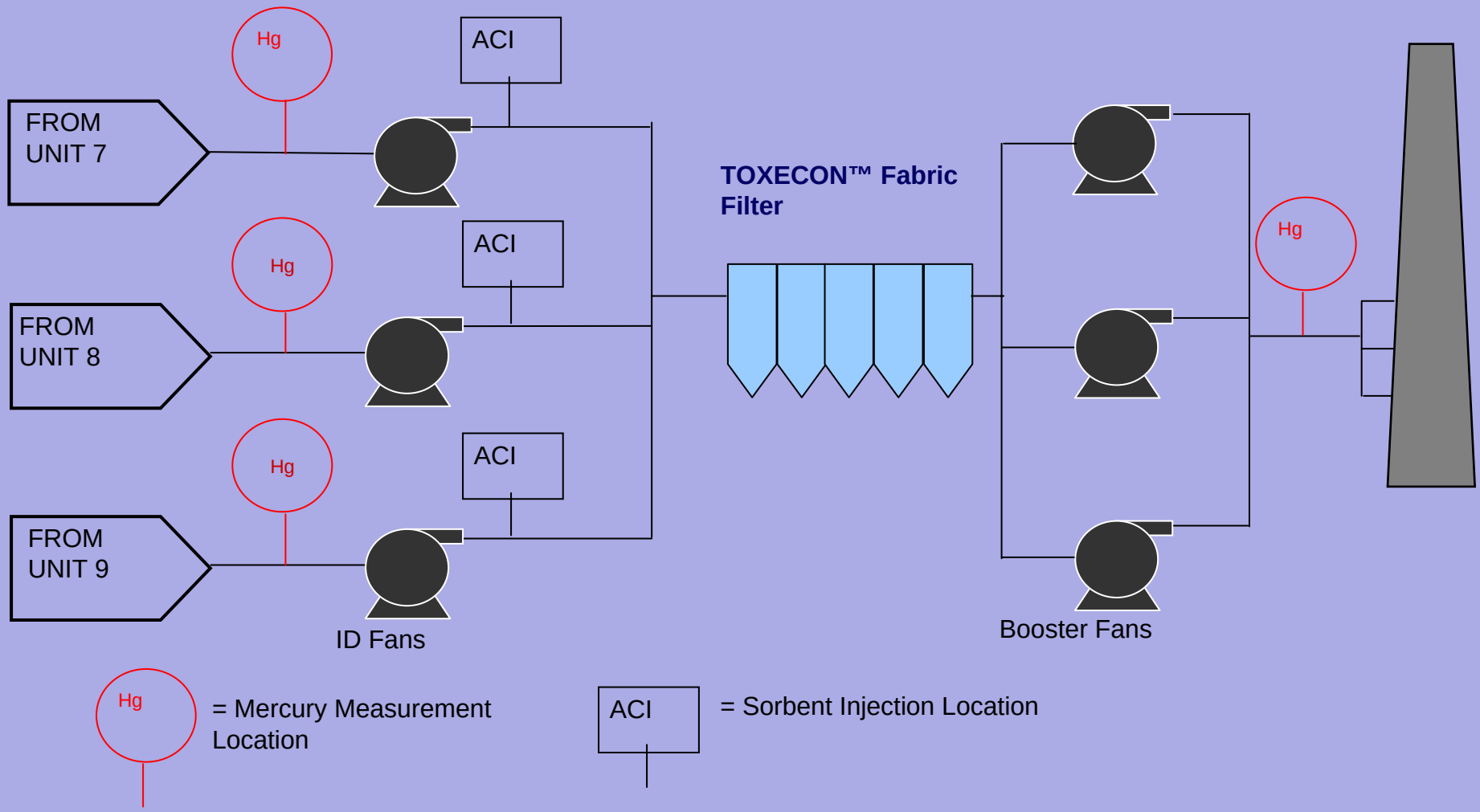


TOXECON™ is an Electric Power Research Institute (EPRI) patented process in which sorbents including powder activated carbon for mercury control and others for NOx and SOX control are injected into the combustion gases downstream of an existing particulate control device and collected by a new particulate control device, typically a pulse jet fabric filter (baghouse).

Toxecon at PIPP

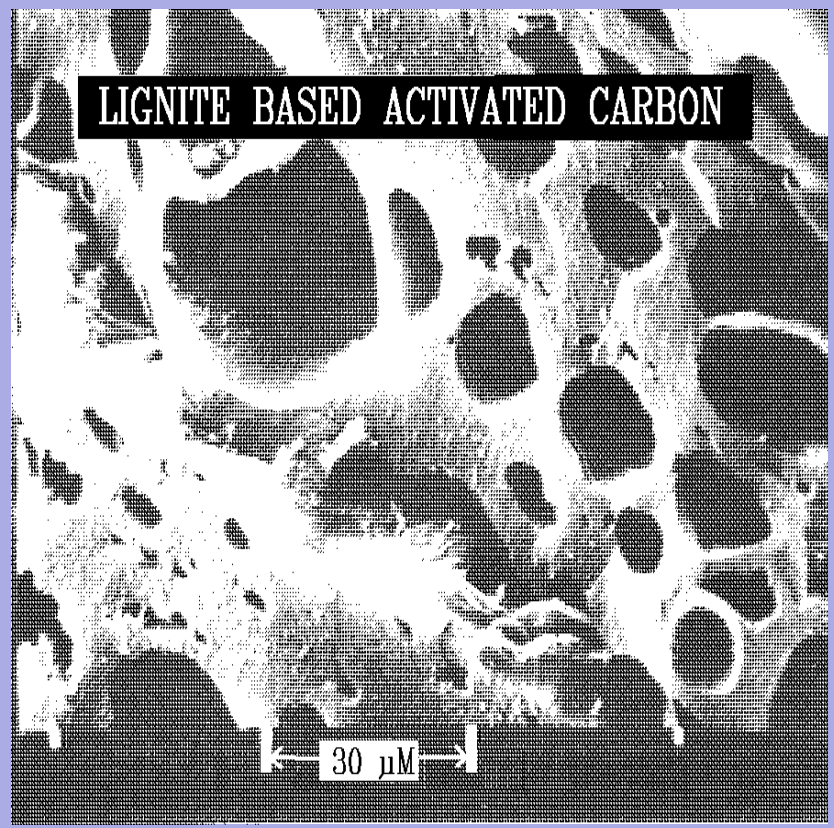


Toxecon at PIPP



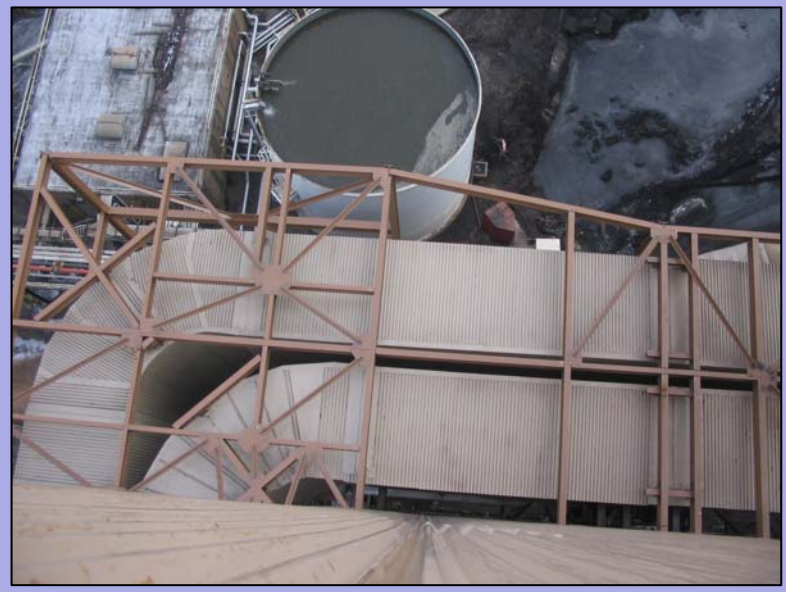
What is Activated Carbon?

- Highly adsorbent powered or granular carbon
- Made from coal, wood, lignite, coconut shells
- Manf. process first carbonizes raw material at low temp, and then activates it in a high temp steam process, finally pulverizing it to powder
- 1 cc has surface area of football field

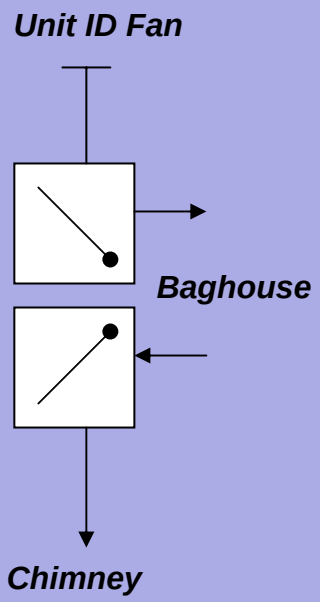


Construction by Lake Superior
Nov 29, 2004

Ductwork



Diverter Dampers



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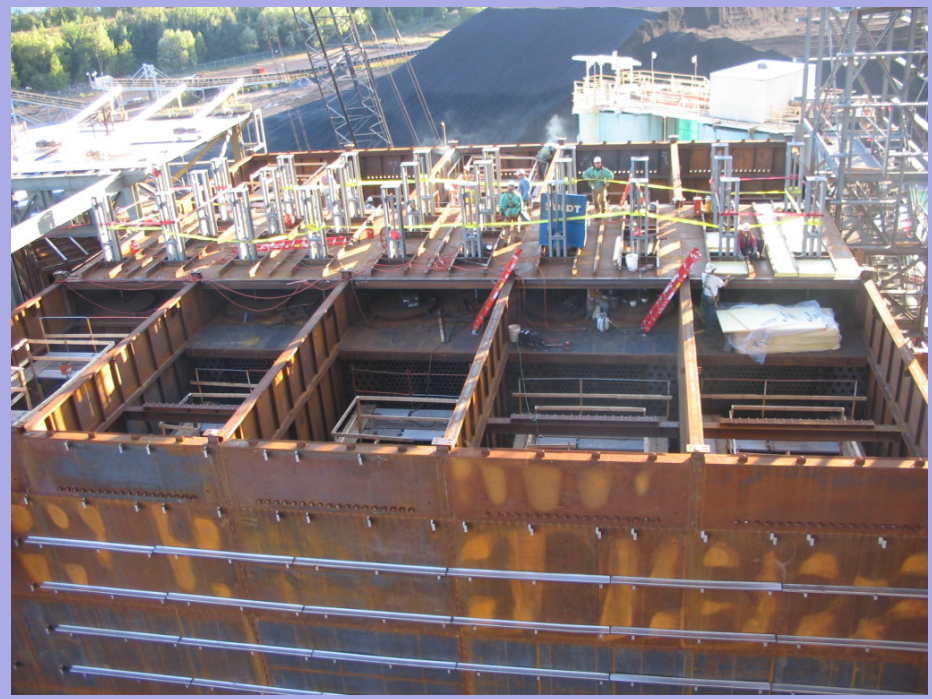
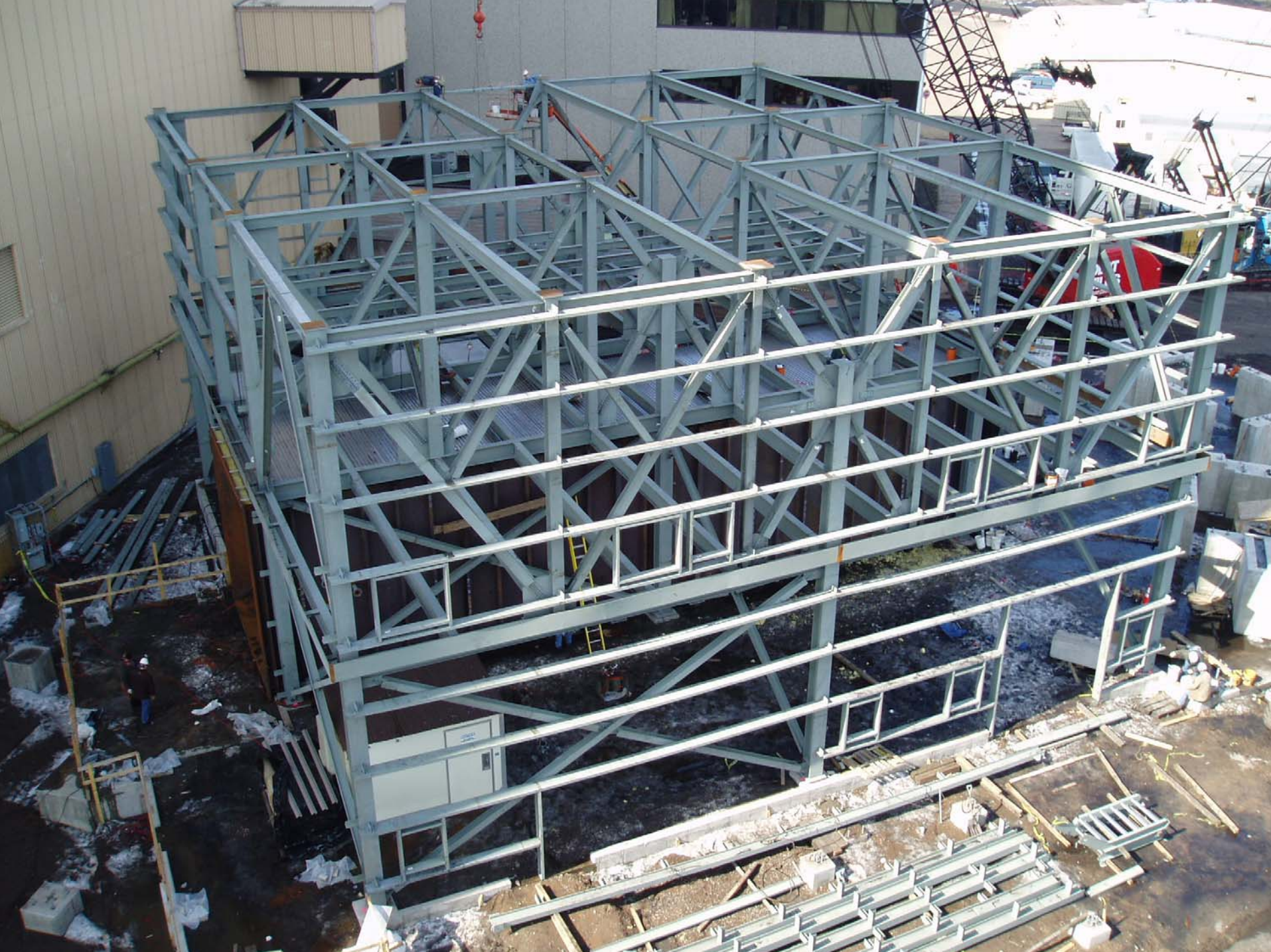
Baghouse

- Wheelabrator Air Pollution Control
- Pulse Jet cleaning
- 10 Compartments
- 5” dia x 26’ long PPS bags
- Gross A/C of 5.5
- 1,200,000 acfm @ 350F
- Return ductwork below baghouse





Booster Fan Enclosure

Loading Hoppers


BOLDT


BOLDT
BOLDT

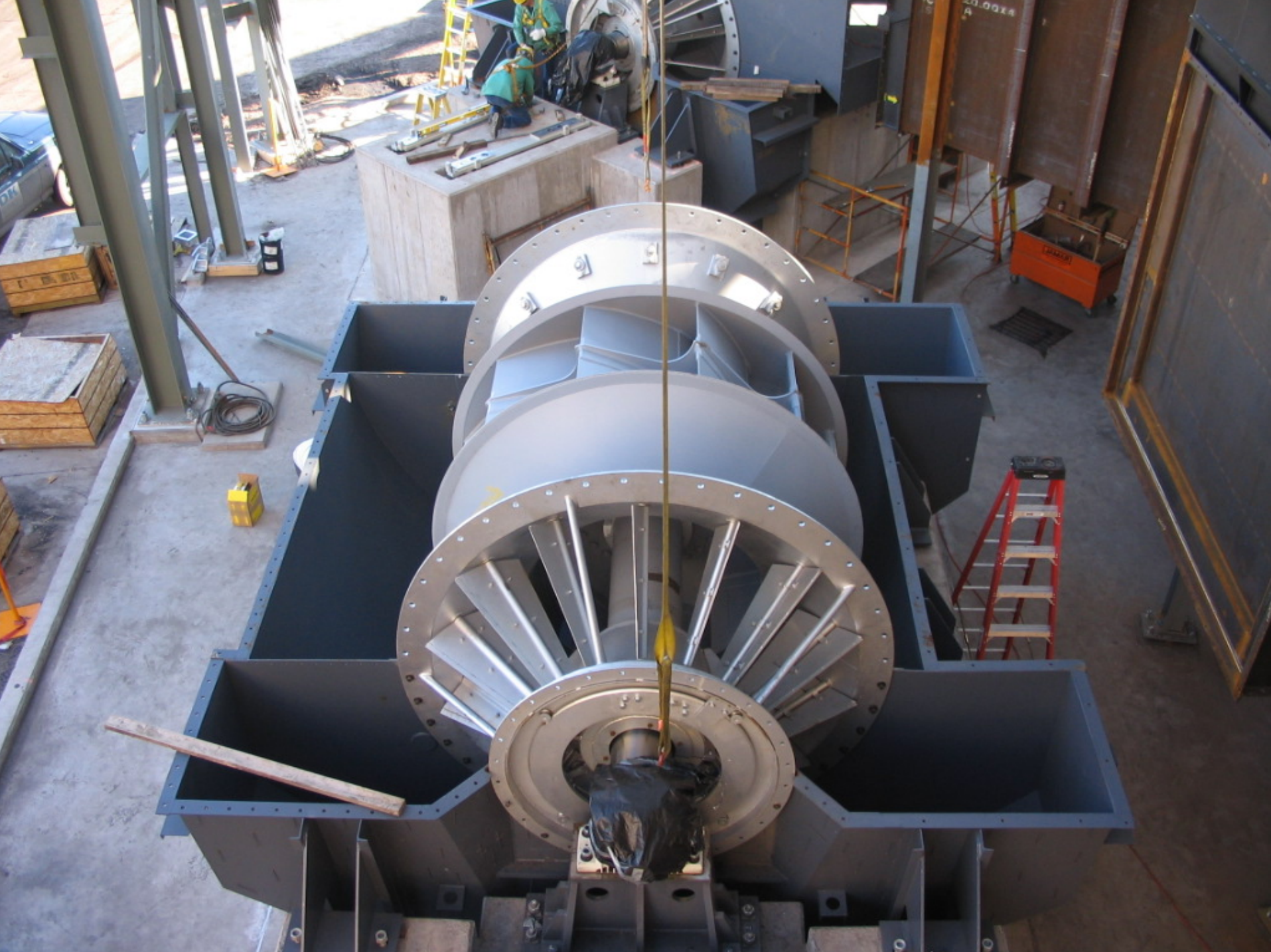

10 000 LB CAPACITY


BOLDT

Booster Fans

- Flaktwoods
- 400,000 acfm @ 14”
- Double inlet
- Airfoil blade
- 893 rpm
- 1,700 hp Motor
- Pressure Lubricated Bearings
- VIV control dampers

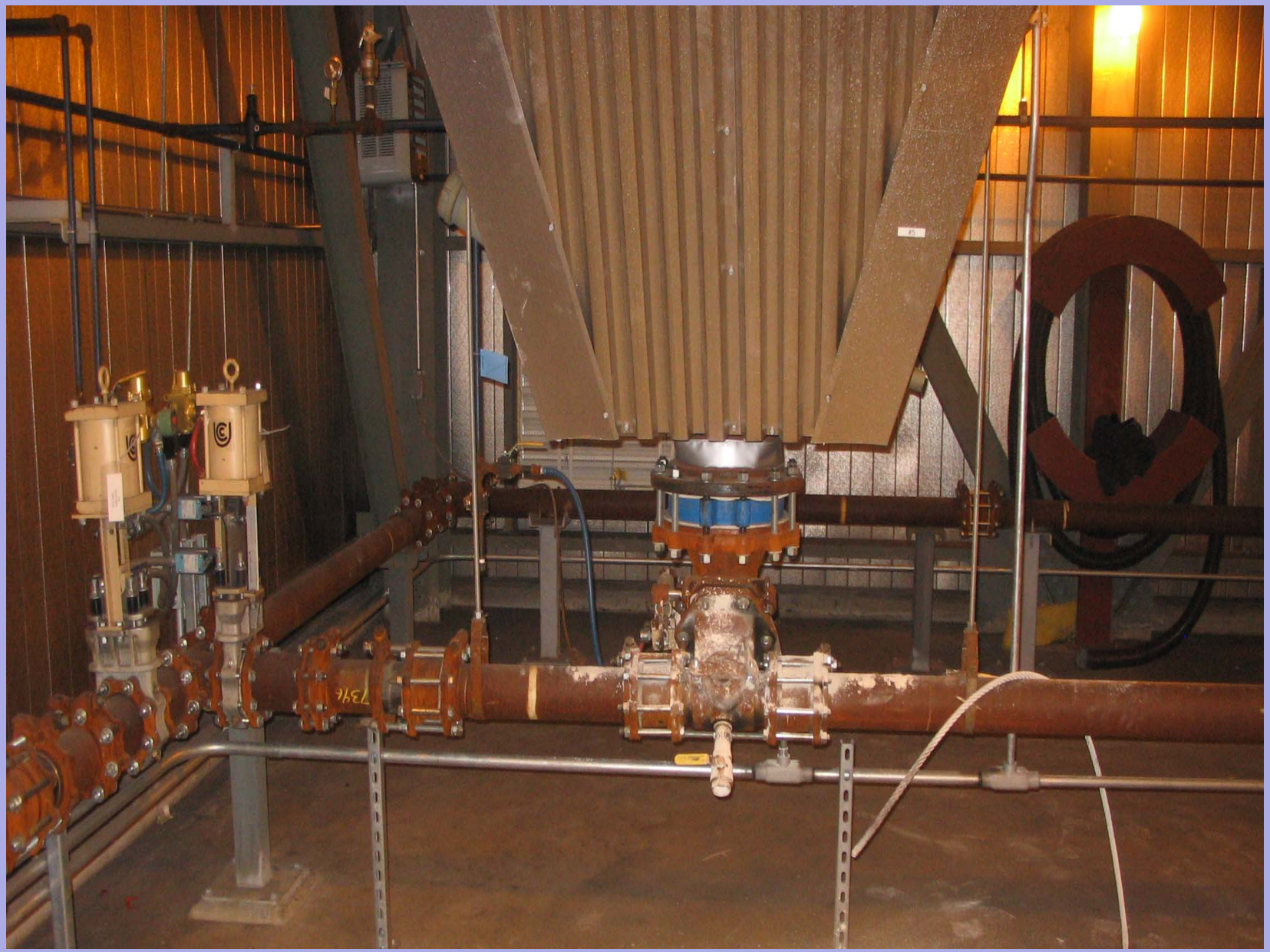

GRIESE & HOSS



PAC System

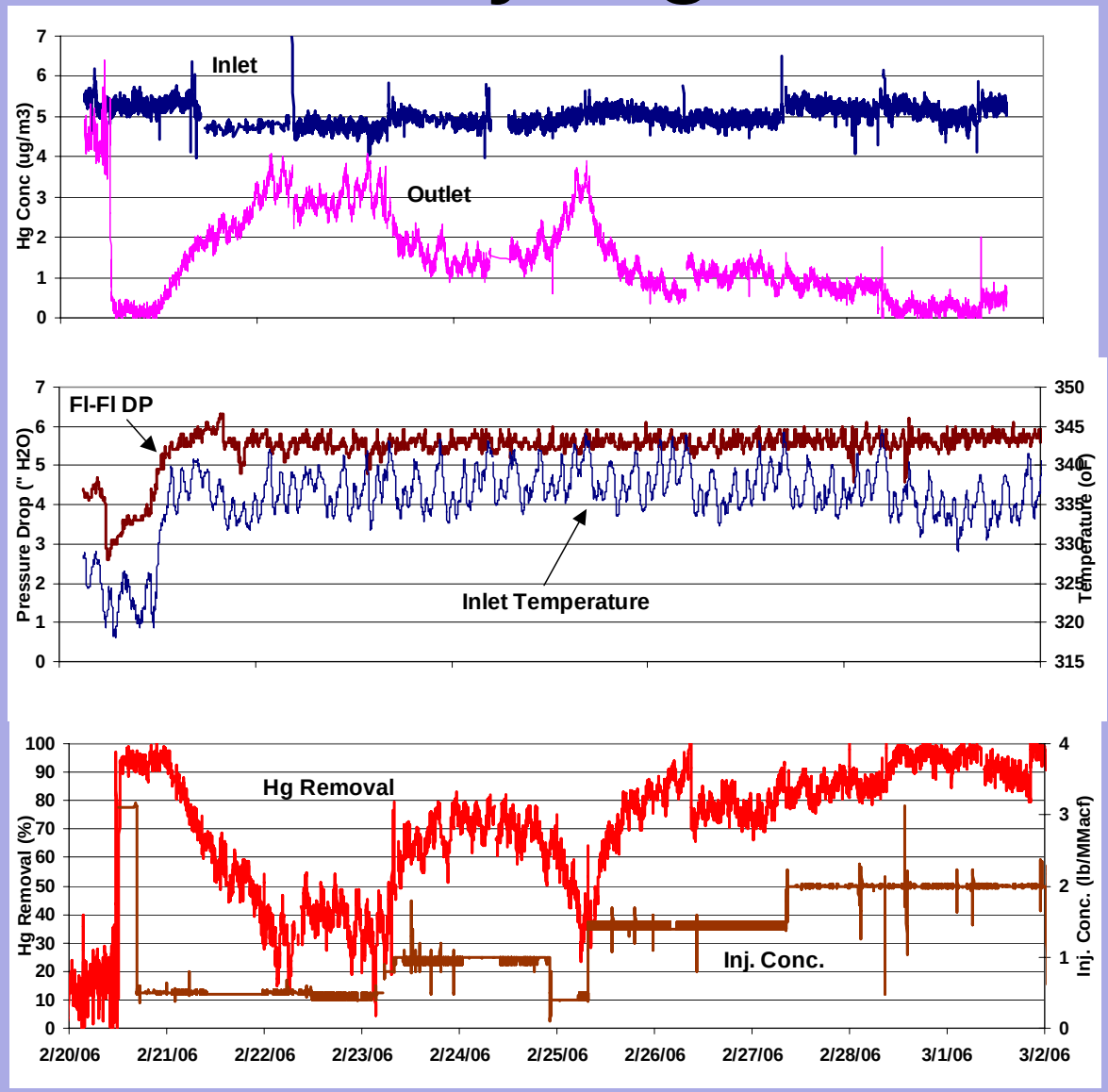
- Norit Americas
- 94,000 lbs (4,290 cuft) storage
- 18 days storage
- Three 200 lb/hr blower trains
- Expected 216 lb/hr injection rate

Ash Handling

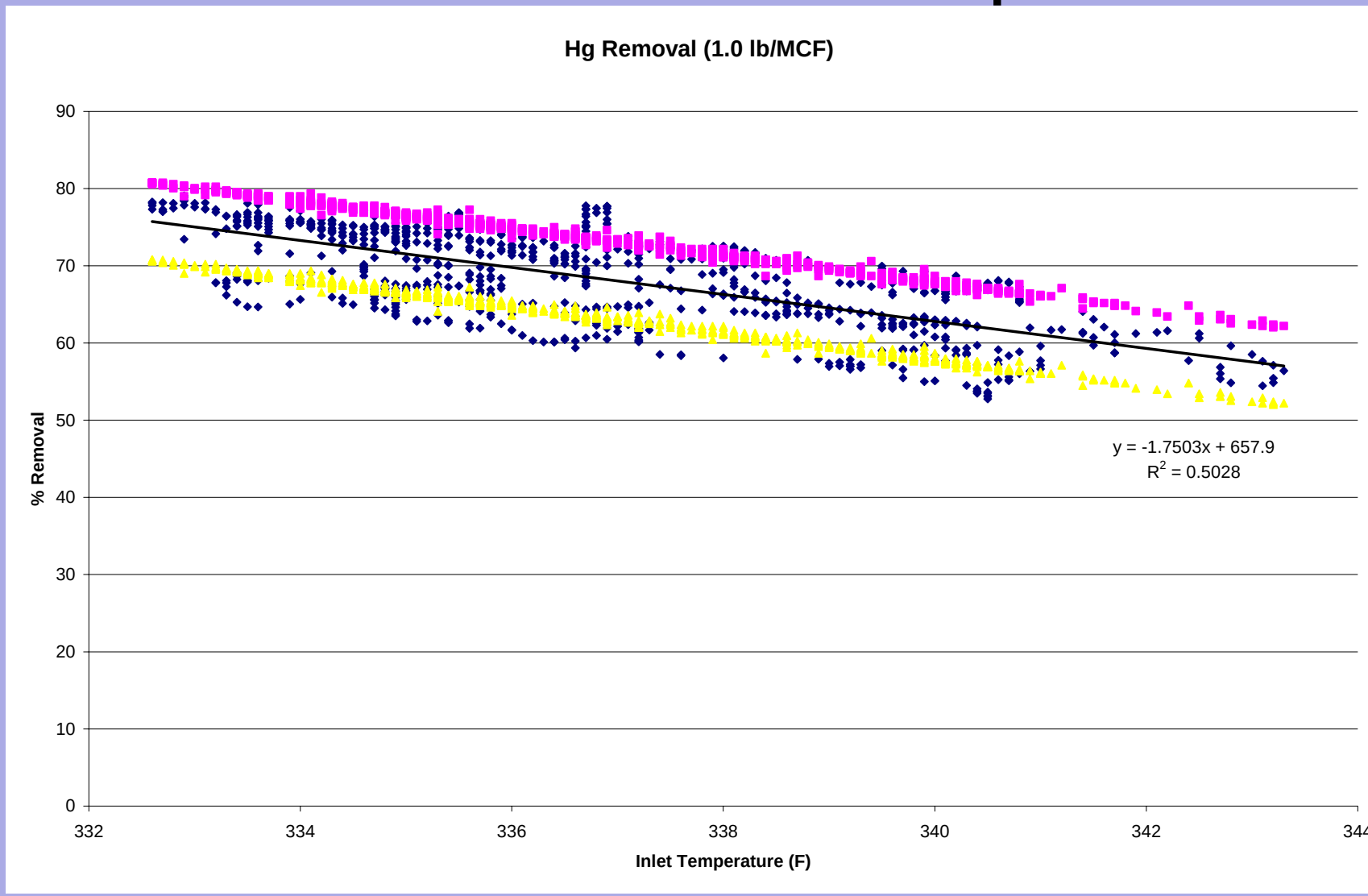


Unloading PAC/ASH

Preliminary Hg Removal



Effects of Flue Gas Temperature



Problem with Overheating PAC

- Hot burning embers found on 2/27
- By 3/2 all hoppers had embers
- Bypassed baghouse to investigate
- 117 bags were failed in #4
- 83 bags were failed in #3
- Likely cause is excessive temperatures from hopper heaters
- Investigation is ongoing

What We Learned So Far

- Temperature source greater than 700 F can cause ignition (welding, cutting, hopper heaters)
- PAC that has been “aged” will continue to burn even if deprived of air
- Hoppers tend to “rat-hole”
- PAC does not burn like normal combustible solids